R·I·T

Title: Karl Suss MA56

Semiconductor & Microsystems
Fabrication Laboratory **Revision: B** **Rev Date: 12/01/2009**

Approved by:

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Process Engineer Equipment Engineer

1 SCOPE

The purpose of this document is to detail the use of the Karl Suss MA56 Mask Aligner. All users are expected to have read and understood this document. It is not a substitute for in-person training on the system and is not sufficient to qualify a user on the system. Failure to follow guidelines in this document may result in loss of privileges.

2 REFERENCE DOCUMENTS

- Material Safety Data Sheets for the resist and developer that you are using.
- Appropriate Tool Manuals

3 DEFINITIONS

n/a

4 TOOLS AND MATERIALS

4.1 General Description

4.1.1 The Karl Suss MA56 may be set up to align and expose with various sized wafers and masks. The features on the mask will print the same size on the wafer so stepper masks will not work on this aligner.

4.2 Mask Holders

4.2.1 There are three different mask holders. See SMFL staff for training on changing aligner configuration.

4.3 Wafer Chucks

4.3.1 Wafer chucks are available for 1, 2, 3 and 4 inch wafers. See SMFL staff for training on changing a chuck.

5 SAFETY PRECAUTIONS

5.1 Personal Safety Hazards

5.1.1 The aligner has a mercury arc ultraviolet light source. Do not look into the direct light area without wearing special UV light protection.

5.1.2 Keep all body parts and objects out of the path of moving parts on the mask aligner.

5.1.3 Do not operate with guards out of place or try to bypass interlocks.

5.2 Hazards to the Tool

5.2.1 Do not clean the aligner with acetone. IPA/ De-ionized water solutions are acceptable to use.

5.2.2 Handle wafers only in a clean atmosphere, use wafer tweezers and appropriate clean room & ESD techniques.

5.2.3 Wafers need to be clean and kept free of contamination as much as possible.

5.2.4 It is a good idea to inspect the backs of the wafers as well as the mask for any resist that could gum up the system.

5.2.5 Make sure that the aligner is set up for the wafer size that you need to use.

5.2.6 Never remove any lenses.

6 INSTRUCTIONS

6.1 Service Chase 2735 Set Up

6.1.1 Turn on "**Manifold**" on **North Nitrogen Manifold 2735**.

6.1.2 Turn on **MA-56 Nitrogen** on **South Nitrogen Manifold 2735**.

6.1.3 Turn on **MA-56 Vacuum** on **Process Vacuum Manifold 2735**.

6.1.3 Turn on **MA-56 CDA** on **CDA Manifold 2735**.

6.2 Starting the Lamp

6.2.1 Turn on **Lamp Power** switch on right side of the aligner if the lamp is out.

6.2.2 Press the **Start** button below the **Lamp Power Switch**; the display should read rdy -> fire -> cold.

6.2.3 Turn on **Main Power** by moving switch from **0** to **1**. (on the right below the exposure console)

6.2.3 To test the lamp or measure lamp intensity, press the **Lamp Test** button on the exposure console.

6.3 Loading the Mask and Wafer

6.3.1 Turn on the Vacuum switch on the right side of the aligner.

6.3.2 Press **Reset** button (5) on right console.

6.3.3 Make sure the **Mikroskop Maske** button (2) and the **Synchronization** button (4) are off. (not lit)

6.3.4 Press **Center Position** button on right console to center mask and microscope.

6.3.5 Bring microscope up by pressing the **Microsc** button (6) on right console.

6.3.6 Press **Mask Clamp** button on right console to release mask plate clamps and remove the mask holder. (not lit)

6.3.7 Insert mask chrome side facing away from the plate wedging the mask first into the two plastic clips then the metal clip on the opposite side.

6.3.8 Press the **Mask Load** button on right console (so that it is lit) to place vacuum on the mask to the plate.

6.3.9 Center the wafer on the chuck using care to properly orient the wafer flat.

6.3.10 Insert the plate on the steel tracks (mask facing down) and slide all the way back.

6.3.11 Press the **Mask Clamp** button to lock the mask plate into place (lamp will lite)

6.3.12 Lower microscope by pressing the **Microsc** button (6).

6.4 Automatic Operation

6.4.1 Choose desired exposure method; **HARD CONTACT**, **CONTACT VACUUM CHAMBER** or **SHADOW PROJECTION** on the exposure console.

6.4.2 For SHADOW PROJECTION, press **N_2 Purge** button on lower console.

6.4.3 Press the **Automatick** button (1) on left console to raise wafer chuck.

6.4.4 Use the large focus knob on the left of scope to focus on mask and wafer.

6.4.4.1 Use the two biggest silver knobs facing you to position the lenses over the wafer.

6.4.4.2 The smaller (offset) silver knobs above the fine focus knobs can be used to blank out either of the lenses.

6.4.5 Align the mask to the wafer

6.4.5.1 Use **Right Joystick** to move microscope in X-Y directions.

6.4.5.2 Use **Left Joystick** to rotate microscope around Z-axis.

6.4.6 Pressing the **Mikroskop Maske** button (2) on left console locks the microscope in place

6.4.7 With the **Mikroskop Maske** button (2) lit, press the **Synchronization** button (4) on right console so that it is lit to just move the mask.

6.4.7.1 Use **Right Joystick** to move mask in X-Y directions.

6.4.7.2 Use **Left Joystick** to rotate mask around Z-axis.

6.4.8 Press **Synchronization** button (4) again to lock mask in place.

6.4.9 Choose exposure time on the Exposure console (incremented by 0.1 seconds).

6.4.10 Press the **Contact Separation** (3) button on right console to contact wafer with mask.

6.4.11 You may press **Contact Separation** (3) again to lower the wafer slightly to realign mask. Then press **Contact Separation** (3) to contact wafer with mask. To completely realign to another location, press the **Reset Align** button on right console with **Contact Separation** (3) off.

6.4.12 Press the **Exposure** button (14) on right console to begin exposure.

6.5 Unloading Mask and Wafer

6.5.1 Raise microscope by pressing **Microsc** button (6).

6.5.2 Press **Mask Clamp** button on right console to release mask plate clamps.

6.5.3 Remove mask holding plate.

6.5.4 Remove the wafer from the chuck.

6.5.5 Press the **Mask Load** button on right console (so that it is no longer lit) to release vacuum on the mask.

6.5.6 Remove mask by applying pressure on the mask towards the plastic clips then lift the mask off.

6.6 Changing the Wafer Chuck

6.6.1 Remove three black retaining screws.

6.6.2 Pull chuck up and flip away from you to reveal air/vacuum tubes.

6.6.3 Remove tubes by unscrewing fittings and carefully pulling off of barbed connector.

6.6.4 Connect tubes to barbed connectors and screw on fittings. (All are labeled 6, 7 or * on both the tubes and wafer chucks).

6.6.5 Place chuck down so that none of the tubes get pinched or kinked.

6.6.6 Screw in three black retaining screws.

6.6.7 Use wafer chuck with rubber seal around the outside only with the 6inch Mask plate for **VACUUM CHAMBER CONTACT.**

7 APPROPRIATE USES OF THE TOOL

7.1 Use caution when doing a hard contact exposure because the wafer may stick to the mask.

7.2 Only clean substrates may be processed.

REVISION RECORD

Summary of Changes	Originator	Rev/Date
Original Issue	Jon Reese	A-01/24/2006
Updated format, removed manual operation section, switched 6.2.1 and 6.2.2, clarified some areas	Sean O'Brien	B-12/01/2009